RAW SEQUENCE LISTING

The Biotechnology Systems Branch of the Scientific and Technical Information Center (STIC) no errors detected.

Application Serial Number: 10/797,553G
Source: IFW00
Date Processed by STIC: 04/27/2006

ENTERED

CRF Errors Edited by the STIC Systems Branch

Serial Number: 10/797,553 CF **CRF Edit Date:** 04/27/2006
Edited by: DA

___ **Realigned nucleic acid/amino acid numbers/text in cases where the sequence text "wrapped" to the next line**

___ **Corrected the SEQ ID NO. Sequence numbers edited were:**

_____

___ **Inserted or corrected a nucleic number at the end of a nucleic line. SEQ ID NO's edited:**

_____

___ **Deleted: ___ invalid beginning/end-of-file text ; ___ page numbers**

___ **Inserted mandatory headings/numeric identifiers, specifically:**

_____

___ **Moved responses to same line as heading/numeric identifier, specifically:**

_____

/ **Other:** Corrected Invalid Amino Acid numbering on Seq ID-56.

Revised 09/09/2003

IFWO

RAW SEQUENCE LISTING DATE: 04/27/2006
PATENT APPLICATION: **US/10/797,553E** TIME: 10:29:55

Input Set : **A:\PTO.CA.txt**
Output Set: **N:\CRF4\04272006\J797553E.raw**

```
 3 <110> APPLICANT: Moyle, William R.
 4       Xing, Yongna
 6 <120> TITLE OF INVENTION: Protein Knobs
 8 <130> FILE REFERENCE: 1092/US PCT
10 <140> CURRENT APPLICATION NUMBER: 10/797,553E
11 <141> CURRENT FILING DATE: 2004-03-10
13 <160> NUMBER OF SEQ ID NOS: 66
15 <170> SOFTWARE: PatentIn version 3.1
17 <210> SEQ ID NO: 1
18 <211> LENGTH: 92
19 <212> TYPE: PRT
20 <213> ORGANISM: Homo sapiens
22 <400> SEQUENCE: 1
24 Ala Pro Asp Val Gln Asp Cys Pro Glu Cys Thr Leu Gln Glu Asn Pro
25 1               5                   10                  15
27 Phe Phe Ser Gln Pro Gly Ala Pro Ile Leu Gln Cys Met Gly Cys Cys
28             20                  25                  30
30 Phe Ser Arg Ala Tyr Pro Thr Pro Leu Arg Ser Lys Lys Thr Met Leu
31         35                  40                  45
33 Val Gln Lys Asn Val Thr Ser Glu Ser Thr Cys Cys Val Ala Lys Ser
34     50                  55                  60
36 Tyr Asn Arg Val Thr Val Met Gly Gly Phe Lys Val Glu Asn His Thr
37 65                  70                  75                  80
39 Ala Cys His Cys Ser Thr Cys Tyr Tyr His Lys Ser
40                 85                  90
43 <210> SEQ ID NO: 2
44 <211> LENGTH: 92
45 <212> TYPE: PRT
46 <213> ORGANISM: Artificial Sequence
48 <220> FEATURE:
49 <223> OTHER INFORMATION: human chorionic gonadotropin alpha-subunit with Cys
50       substituted for Gln5
52 <400> SEQUENCE: 2
54 Ala Pro Asp Val Cys Asp Cys Pro Glu Cys Thr Leu Gln Glu Asn Pro
55 1               5                   10                  15
57 Phe Phe Ser Gln Pro Gly Ala Pro Ile Leu Gln Cys Met Gly Cys Cys
58             20                  25                  30
60 Phe Ser Arg Ala Tyr Pro Thr Pro Leu Arg Ser Lys Lys Thr Met Leu
61         35                  40                  45
63 Val Gln Lys Asn Val Thr Ser Glu Ser Thr Cys Cys Val Ala Lys Ser
64     50                  55                  60
66 Tyr Asn Arg Val Thr Val Met Gly Gly Phe Lys Val Glu Asn His Thr
67 65                  70                  75                  80
```

RAW SEQUENCE LISTING DATE: 04/27/2006
PATENT APPLICATION: US/10/797,553E TIME: 10:29:55

Input Set : A:\PTO.DA.txt
Output Set: N:\CRF4\04272006\J797553E.raw

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 69 Ala Cys His Cys Ser Thr Cys Tyr Tyr His Lys Ser
 70                 85                  90
 72 <210> SEQ ID NO: 3
 73 <211> LENGTH: 92
 74 <212> TYPE: PRT
 75 <213> ORGANISM: Artificial Sequence
 77 <220> FEATURE:
 78 <223> OTHER INFORMATION: human chorionic gonadotropin alpha-subunit with Cys
 79       substituted for Leu12
 81 <400> SEQUENCE: 3
 83 Ala Pro Asp Val Gln Asp Cys Pro Glu Cys Thr Cys Gln Glu Asn Pro
 84 1               5                   10                  15
 86 Phe Phe Ser Gln Pro Gly Ala Pro Ile Leu Gln Cys Met Gly Cys Cys
 87             20                  25                  30
 89 Phe Ser Arg Ala Tyr Pro Thr Pro Leu Arg Ser Lys Lys Thr Met Leu
 90         35                  40                  45
 92 Val Gln Lys Asn Val Thr Ser Glu Ser Thr Cys Cys Val Ala Lys Ser
 93     50                  55                  60
 95 Tyr Asn Arg Val Thr Val Met Gly Gly Phe Lys Val Glu Asn His Thr
 96 65                  70                  75                  80
 98 Ala Cys His Cys Ser Thr Cys Tyr Tyr His Lys Ser
 99                 85                  90
102 <210> SEQ ID NO: 4
103 <211> LENGTH: 92
104 <212> TYPE: PRT
105 <213> ORGANISM: Artificial Sequence
107 <220> FEATURE:
108 <223> OTHER INFORMATION: human chorionic gonadotropin alpha-subunit with Cys
109       substituted for Asn15
111 <400> SEQUENCE: 4
113 Ala Pro Asp Val Gln Asp Cys Pro Glu Cys Thr Leu Gln Glu Cys Pro
114 1               5                   10                  15
116 Phe Phe Ser Gln Pro Gly Ala Pro Ile Leu Gln Cys Met Gly Cys Cys
117             20                  25                  30
119 Phe Ser Arg Ala Tyr Pro Thr Pro Leu Arg Ser Lys Lys Thr Met Leu
120         35                  40                  45
122 Val Gln Lys Asn Val Thr Ser Glu Ser Thr Cys Cys Val Ala Lys Ser
123     50                  55                  60
125 Tyr Asn Arg Val Thr Val Met Gly Gly Phe Lys Val Glu Asn His Thr
126 65                  70                  75                  80
128 Ala Cys His Cys Ser Thr Cys Tyr Tyr His Lys Ser
129                85                  90
132 <210> SEQ ID NO: 5
133 <211> LENGTH: 92
134 <212> TYPE: PRT
135 <213> ORGANISM: Artificial Sequence
137 <220> FEATURE:
138 <223> OTHER INFORMATION: human chorionic gonadotropin alpha-subunit with Cys
139       substituted for Phe17
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RAW SEQUENCE LISTING DATE: 04/27/2006
PATENT APPLICATION: US/10/797,553E TIME: 10:29:55

Input Set : A:\PTO.DA.txt
Output Set: N:\CRF4\04272006\J797553E.raw

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141 <400> SEQUENCE: 5
143 Ala Pro Asp Val Gln Asp Cys Pro Glu Cys Thr Leu Gln Glu Asn Pro
144 1               5                   10                  15
146 Cys Phe Ser Gln Pro Gly Ala Pro Ile Leu Gln Cys Met Gly Cys Cys
147             20                  25                  30
149 Phe Ser Arg Ala Tyr Pro Thr Pro Leu Arg Ser Lys Lys Thr Met Leu
150         35                  40                  45
152 Val Gln Lys Asn Val Thr Ser Glu Ser Thr Cys Cys Val Ala Lys Ser
153     50                  55                  60
155 Tyr Asn Arg Val Thr Val Met Gly Gly Phe Lys Val Glu Asn His Thr
156 65                  70                  75                  80
158 Ala Cys His Cys Ser Thr Cys Tyr Tyr His Lys Ser
159                 85                  90
162 <210> SEQ ID NO: 6
163 <211> LENGTH: 92
164 <212> TYPE: PRT
165 <213> ORGANISM: Artificial Sequence
167 <220> FEATURE:
168 <223> OTHER INFORMATION: human chorionic gonadotropin alpha-subunit with Cys
169       substituted for Leu22
171 <400> SEQUENCE: 6
173 Ala Pro Asp Val Gln Asp Cys Pro Glu Cys Thr Leu Gln Glu Asn Pro
174 1               5                   10                  15
176 Phe Phe Ser Gln Pro Cys Ala Pro Ile Leu Gln Cys Met Gly Cys Cys
177             20                  25                  30
179 Phe Ser Arg Ala Tyr Pro Thr Pro Leu Arg Ser Lys Lys Thr Met Leu
180         35                  40                  45
182 Val Gln Lys Asn Val Thr Ser Glu Ser Thr Cys Cys Val Ala Lys Ser
183     50                  55                  60
185 Tyr Asn Arg Val Thr Val Met Gly Gly Phe Lys Val Glu Asn His Thr
186 65                  70                  75                  80
188 Ala Cys His Cys Ser Thr Cys Tyr Tyr His Lys Ser
189                 85                  90
192 <210> SEQ ID NO: 7
193 <211> LENGTH: 92
194 <212> TYPE: PRT
195 <213> ORGANISM: Artificial Sequence
197 <220> FEATURE:
198 <223> OTHER INFORMATION: human chorionic gonadotropin alpha-subunit with Cys
199       substituted for Gln7
201 <400> SEQUENCE: 7
203 Ala Pro Asp Val Gln Asp Cys Pro Glu Cys Thr Leu Gln Glu Asn Pro
204 1               5                   10                  15
206 Phe Phe Ser Gln Pro Gly Ala Pro Ile Leu Cys Cys Met Gly Cys Cys
207             20                  25                  30
209 Phe Ser Arg Ala Tyr Pro Thr Pro Leu Arg Ser Lys Lys Thr Met Leu
210         35                  40                  45
212 Val Gln Lys Asn Val Thr Ser Glu Ser Thr Cys Cys Val Ala Lys Ser
213     50                  55                  60
```

RAW SEQUENCE LISTING DATE: 04/27/2006
PATENT APPLICATION: US/10/797,553E TIME: 10:29:55

Input Set : A:\PTO.DA.txt
Output Set: N:\CRF4\04272006\J797553E.raw

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215 Tyr Asn Arg Val Thr Val Met Gly Gly Phe Lys Val Glu Asn His Thr
216 65                  70                  75                  80
218 Ala Cys His Cys Ser Thr Cys Tyr Tyr His Lys Ser
219                 85                  90
222 <210> SEQ ID NO: 8
223 <211> LENGTH: 92
224 <212> TYPE: PRT
225 <213> ORGANISM: Artificial Sequence
227 <220> FEATURE:
228 <223> OTHER INFORMATION: human chorionic gonadotropin alpha-subunit with Cys
229       subsituted for Leu22
231 <400> SEQUENCE: 8
233 Ala Pro Asp Val Gln Asp Cys Pro Glu Cys Thr Cys Gln Glu Asn Pro
234 1               5                   10                  15
236 Phe Phe Ser Gln Pro Cys Ala Pro Ile Leu Gln Cys Met Gly Cys Cys
237             20                  25                  30
239 Phe Ser Arg Ala Tyr Pro Thr Pro Leu Arg Ser Lys Lys Thr Met Leu
240         35                  40                  45
242 Val Gln Lys Asn Val Thr Ser Glu Ser Thr Cys Cys Val Ala Lys Ser
243     50                  55                  60
245 Tyr Asn Arg Val Thr Val Met Gly Gly Phe Lys Val Glu Asn His Thr
246 65                  70                  75                  80
248 Ala Cys His Cys Ser Thr Cys Tyr Tyr His Lys Ser
249                 85                  90
252 <210> SEQ ID NO: 9
253 <211> LENGTH: 92
254 <212> TYPE: PRT
255 <213> ORGANISM: Artificial Sequence
257 <220> FEATURE:
258 <223> OTHER INFORMATION: human chorionic gonadotropin alpha-subunit with Cys
259       subsituted for Arg35
261 <400> SEQUENCE: 9
263 Ala Pro Asp Val Gln Asp Cys Pro Glu Cys Thr Leu Gln Glu Asn Pro
264 1               5                   10                  15
267 Phe Phe Ser Gln Pro Gly Ala Pro Ile Leu Gln Cys Met Gly Cys Cys
268             20                  25                  30
271 Phe Ser Cys Ala Tyr Pro Thr Pro Leu Arg Ser Lys Lys Thr Met Leu
272         35                  40                  45
275 Val Gln Lys Asn Val Thr Ser Glu Ser Thr Cys Cys Val Ala Lys Ser
276     50                  55                  60
279 Tyr Asn Arg Val Thr Val Met Gly Gly Phe Lys Val Glu Asn His Thr
280 65                  70                  75                  80
283 Ala Cys His Cys Ser Thr Cys Tyr Tyr His Lys Ser
284                 85                  90
287 <210> SEQ ID NO: 10
288 <211> LENGTH: 92
289 <212> TYPE: PRT
290 <213> ORGANISM: Artificial Sequence
292 <220> FEATURE:
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RAW SEQUENCE LISTING DATE: 04/27/2006
PATENT APPLICATION: US/10/797,553E TIME: 10:29:55

Input Set : A:\PTO.DA.txt
Output Set: N:\CRF4\04272006\J797553E.raw

```
293 <223> OTHER INFORMATION: human chorionic gonadotropin alpha-subunit with Cys
294       substituted for Tyr37
296 <400> SEQUENCE: 10
298 Ala Pro Asp Val Gln Asp Cys Pro Glu Cys Thr Leu Gln Glu Asn Pro
299 1               5                   10                  15
302 Phe Phe Ser Gln Pro Gly Ala Pro Ile Leu Gln Cys Met Gly Cys Cys
303             20                  25                  30
306 Phe Ser Arg Ala Cys Pro Thr Pro Leu Arg Ser Lys Lys Thr Met Leu
307         35                  40                  45
310 Val Gln Lys Asn Val Thr Ser Glu Ser Thr Cys Cys Val Ala Lys Ser
311     50                  55                  60
314 Tyr Asn Arg Val Thr Val Met Gly Gly Phe Lys Val Glu Asn His Thr
315 65                  70                  75                  80
318 Ala Cys His Cys Ser Thr Cys Tyr Tyr His Lys Ser
319                 85                  90
322 <210> SEQ ID NO: 11
323 <211> LENGTH: 92
324 <212> TYPE: PRT
325 <213> ORGANISM: Artificial Sequence
327 <220> FEATURE:
328 <223> OTHER INFORMATION: human chorionic gonadotropin alpha-subunit with Cys
329       substituted for Pro38
331 <400> SEQUENCE: 11
333 Ala Pro Asp Val Gln Asp Cys Pro Glu Cys Thr Leu Gln Glu Asn Pro
334 1               5                   10                  15
337 Phe Phe Ser Gln Pro Gly Ala Pro Ile Leu Gln Cys Met Gly Cys Cys
338             20                  25                  30
341 Phe Ser Arg Ala Tyr Cys Thr Pro Leu Arg Ser Lys Lys Thr Met Leu
342         35                  40                  45
345 Val Gln Lys Asn Val Thr Ser Glu Ser Thr Cys Cys Val Ala Lys Ser
346     50                  55                  60
349 Tyr Asn Arg Val Thr Val Met Gly Gly Phe Lys Val Glu Asn His Thr
350 65                  70                  75                  80
353 Ala Cys His Cys Ser Thr Cys Tyr Tyr His Lys Ser
354                 85                  90
357 <210> SEQ ID NO: 12
358 <211> LENGTH: 92
359 <212> TYPE: PRT
360 <213> ORGANISM: Artificial Sequence
362 <220> FEATURE:
363 <223> OTHER INFORMATION: human chorionic gonadotropin alpha-subunit with Cys
364       substituted for Thr39
366 <400> SEQUENCE: 12
368 Ala Pro Asp Val Gln Asp Cys Pro Glu Cys Thr Leu Gln Glu Asn Pro
369 1               5                   10                  15
372 Phe Phe Ser Gln Pro Gly Ala Pro Ile Leu Gln Cys Met Gly Cys Cys
373             20                  25                  30
376 Phe Ser Arg Ala Tyr Pro Cys Pro Leu Arg Ser Lys Lys Thr Met Leu
377         35                  40                  45
```

RAW SEQUENCE LISTING ERROR SUMMARY DATE: 04/27/2006
PATENT APPLICATION: **US/10/797,553E** TIME: 10:29:56

Input Set : **A:\PTO.DA.txt**
Output Set: **N:\CRF4\04272006\J797553E.raw**

Please Note:
Use of n and/or Xaa have been detected in the Sequence Listing. Please review the Sequence Listing to ensure that a corresponding explanation is presented in the <220> to <223> fields of each sequence which presents at least one n or Xaa.

Seq#:56; Xaa Pos. 1,2,3,4,5,6,7,8,9,10,17,18,19,20,21,22,23,24,25,26,28,29
Seq#:56; Xaa Pos. 30,31,32,33,34,35,36,37

VERIFICATION SUMMARY DATE: 04/27/2006
PATENT APPLICATION: **US/10/797,553E** TIME: 10:29:56

Input Set : **A:\PTO.DA.txt**
Output Set: **N:\CRF4\04272006\J797553E.raw**

L:1345 M:259 W: Allowed number of lines exceeded, <223> Other Information:
L:2179 M:258 W: Mandatory Feature missing, <221> Tag not found for SEQ ID#:56
L:2179 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:56 after pos.:0
L:2181 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:56 after pos.:16
L:2185 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:56 after pos.:32

Raw Sequence Listing before editing,
for reference only

IFWO

RAW SEQUENCE LISTING DATE: 04/25/2006
PATENT APPLICATION: **US/10/797,553E** TIME: 10:18:26

Input Set : **A:\1092 US PCT SEQ LIST.4.19.06.txt**
Output Set: **N:\CRF4\04252006\J797553E.raw**

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  3 <110> APPLICANT: Moyle, William R.
  4       Xing, Yongna
  6 <120> TITLE OF INVENTION: Protein Knobs
  8 <130> FILE REFERENCE: 1092/US PCT
 10 <140> CURRENT APPLICATION NUMBER: 10/797,553E
 11 <141> CURRENT FILING DATE: 2004-03-10
 13 <160> NUMBER OF SEQ ID NOS: 66
 15 <170> SOFTWARE: PatentIn version 3.1
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Does Not Comply
Corrected Diskette Needed
(pg-1)

ERRORED SEQUENCES

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2167 <210> SEQ ID NO: 56
2168 <211> LENGTH: 37
2169 <212> TYPE: PRT
2170 <213> ORGANISM: Artificial Sequence
2172 <220> FEATURE:
2173 <222> LOCATION: Xaa may be amino acids 1-10, 17-26 and 28-37 of tail portion
2174 <223> OTHER INFORMATION: Xaa is any amino acid in the tail portion and some of the
Xaa
2175       may be missing from the tail portion
2177 <400> SEQUENCE: 56
W--> 2179 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asp Asp Asp Asp Lys Ser
E--> 2180 1       5       10      15
2183 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Cys Xaa Xaa Xaa Xaa Xaa
2184            20                  25                  30
2187 Xaa Xaa Xaa Xaa Xaa
2188         35
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Invalid Amino Acid numbering.

VERIFICATION SUMMARY DATE: 04/25/2006
PATENT APPLICATION: **US/10/797,553E** TIME: 10:18:27

Input Set : **A:\1092 US PCT SEQ LIST.4.19.06.txt**
Output Set: **N:\CRF4\04252006\J797553E.raw**

L:1345 M:259 W: Allowed number of lines exceeded, <223> Other Information:
L:2179 M:258 W: Mandatory Feature missing, <221> Tag not found for SEQ ID#:56
L:2179 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:56 after pos.:0
L:2180 M:332 E: (32) Invalid/Missing Amino Acid Numbering, SEQ ID:56
M:341 Repeated in SeqNo=56